AMPÈRE AND COULOMB

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A century ago on June 10 France lost one of her great philosophers, André Marie Ampère, while almost a century before that, on June 14, 1736, there was born Charles Augustin Coulomb. These two men contributed in no small way to the lustre with which France outshone the rest of the nations in science in the earlier part of the nineteenth century. It was Matthew Arnold who wrote of France, famed in all great arts, being supreme in none. Yet she certainly showed a superiority in that era, with a brilliant array of names. Both Ampère and Coulomb are names worthy of commemoration. For while discoverers in the electrical field of more modern days usually reap a rich reward, these two men have but the perpetuation of their names to mark their contributions to the basis of all progress in the science.

We have the unit "coulomb" and the torsion balance handled in our student days to perpetuate the earlier of the two; but these are of academic interest rather than practical. Ampère, on the other hand, was more fortunate, for his name is on every current-measurer in the world, and France has issued a memorial stamp to jog our memory further.

As an infant Ampère was a prodigy, using pebbles and beans to work out arithmetical sums before he knew the figures. When these were taken away from him by parents alarmed at such over-developed ability, he showed the first signs of the coming research-worker by finding substitutes for apparatus not available. He used bread crumbs. The child grew up to consume greedily large portions of history, poetry, and philosophy. In the Lyons library where his father took him, he asked for the works of Bernoulli and Euler. "Reflect, my little friend. These works rank among the most abstruse the human mind has ever produced," was the comment of the librarian. He was not put off even by the Latin in which they were written, but returned when he had gained proficiency in it. And his marvellous memory meant that years later he was able to quote pages of text on falconry and on a host of other topics digested in his youth.

His progress was marred by tragedy. There is no record in human history of a happy philosopher—or so Mencken tells us. When but eighteen years of age the first cruel blow came, for his father was thrown into prison with the taking of Lyons by the army of the Convention, and then was beheaded. In a last letter to his wife Jean Jacques Ampère asked that his daughter should never be told of his fate, "but as for my son, I expect everything of him." It took a few years for the son to get back to the philosopher's way, to forget his sorrow in the works of Rousseau. A second blow to a sensitive mind came in 1804 with the death of his wife, beloved Julie Carron, whom he met gathering flowers by a stream near Polémieux, where Ampère was botanizing. In spite of such setbacks Ampère continued on the road to fame. He had been saved for science when the parents of Julie Carron failed to persuade him to get a fixed job, to work in a shop unfolding silks from morn till night. Instead of this he became professor at Bourg and later at the École Polytechnique in Paris. There were those who maintained that he was never intended to be a teacher, that research was his true *métier*. But he was a popular lecturer, for he had a way with students. One day, waving about a ruler in his enthusiasm, he hit a tumbler and the fragments of glass fell into his *eau sucrée*. To the horror of his students he drank the latter in spite of their cries concerning the danger of broken glass. He reminded them of the difference in specific gravity between glass and the liquid and pointed out that he had held the vessel at an appropriate angle. "Ah! If I had drunk at this angle," he cried, tilting it more, "—but I was too knowing for that"!

Within seven days of hearing of Oerstedt's discovery of the magnetic effect of a current, Ampère presented a paper to the Academy. He went further than other workers on this subject by showing both attraction and repulsion between two parallel wires carrying currents and also between magnets and wires. Unlike his abstruse theories, his experiments carried a note of simplicity. No one before him had succeeded in showing that the earth could act like a lodestone on a current-carrying wire. But Ampère did it, and the philosophers of Europe crowded the little study in the Rue Fossée-St. Victor to witness a single platinum wire taking a definite direction influenced by the earth's magnetism. His liking for simple things was shown in other activities in life. We hear of him suffering ennui on hearing at a concert those works of Gluck beyond his understanding, and he turned his back on the assembly. Yet a little later this same philosopher gave way to copious tears when some simple melody soothed his mind.

Coulomb's bicentenary is overshadowed by commemoration of Ampère, for he worked on static electricity which proved not so moving as the current electricity of his contemporary. As far back as 600 B.C. Thales observed that amber when rubbed attracted light bodies. This was due to static electricity, and this branch may be said to have remained static until men like Coulomb appeared on the scene. As an ex-military engineer he dealt with attractions and repulsions and charges on surfaces, and he bequeathed us his torsion balance for yielding quantitative results. Two Academy prizes came his way, one for work on magnetic needles and the other for his *Théorie des Machines Simples*. He had plenty of time for research, for on the outbreak of the Revolution he had wisely retired to Blois to study the less dangerous vibrations of his balance. "La République n'a pas besoin de savants" was the cry when another philosopher, Lavoisier, went to the scaffold. Coulomb kept clear of the upheaval. The mathematical theory of electricity of the great Poisson was based on Coulomb's electrical memoirs.

In June 1936, then, in an electrical era of light and power, we commemorate these two men, who with a touch of cold philosophy "conquered all mysteries by rule and line, emptied the haunted air, the gnoméd mine."